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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER
FISCHER, JUSTIN R

ART UNIT	PAPER NUMBER
1733	

DATE MAILED: 09/03/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/915,886	BURPO ET AL.	
	Examiner	Art Unit	
	Justin R Fischer	1733	

-- The MAILING DATE of this communication appears on the cover sh et with the correspond nc address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 July 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) *19* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 April 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *4* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

   I. Claims 1-18, drawn to a method of forming a composite laminate structure, classified in class 156, subclass 62.2.

   II. Claim 19, drawn to a joint, classified in class 428, subclass 195.1.

2. Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case, the joint can be made by a materially different process, for example one in which prepegs are used instead of dry fiber preforms or one in which the composite laminate assembly is not placed in an airtight enclosure for heating of the adhesive material.

3. During a telephone conversation with Mr. Bryant Wade on August 22, 2003 a provisional election was made with traverse to prosecute the invention of a method of forming a composite laminate structure, claims 1-18. Affirmation of this election must be made by applicant in replying to this Office action. Claim 19 is withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Claim Rejections - 35 USC § 102 / 103

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1, 2, and 4-6 are rejected under 35 U.S.C. 102(b) as anticipated by Flonc (US 5,080,851) or, in the alternative, under 35 U.S.C. 103(a) as obvious over Flonc in view of Crane (US 4,695,344). Flonc teaches a method of forming a composite laminate structure comprising the steps of providing a first dry fiber preform 1, placing a thin film adhesive "material" 4 against a surface of said first dry fiber preform, placing a second dry fiber preform against said adhesive material, placing the adhesive/preform assembly in a vacuum bag, heating the adhesive/preform assembly in order to liquefy the adhesive material and bond the layers, placing the assembly in a mold cavity, and injecting resin into the assembly and thus wetting all of the dry fiber preforms (Column 2, Lines 13-20 and Column 3, Line 10 – Column 4, Line 15). In describing the "thin film adhesive material", Flonc describes a solid resin may be sprinkled or sprayed onto each layer (Column 3, Lines 10-15). In this instance, the claimed language "thin film

adhesive material" does not positively require a self-supporting film but rather defines the ability of a given material to form a thin film adhesive (e.g. upon heating). As such, Flonc does teach the application of a thin film adhesive "material". In any event, if applicant intends the language to require the adhesive be applied as a self-supporting film, one of ordinary skill in the art at the time of the invention would have found it obvious to apply the adhesive of Flonc as a film. In particular, Flonc specifically suggests that the adhesive material is applied as a solid and it is well known that adhesive films represent a suitable and extensively used arrangement for the application of solid adhesive materials. Crane provides one example of a similar fiber reinforced composite in which an adhesive or resin sheet is applied to the surface of a dry fiber preform (Figure 1 and Column 3, Lines 15-20). Thus, it is recognized in the composite industry that adhesive or resin materials can be applied in film or sheet form and as such, it would have been obvious to one of ordinary skill in the art at the time of the invention to arrange the adhesive material of Flonc as a "thin film adhesive material".

Regarding claim 2, Flonc teaches heating the mold to the curing temperature in combination with the injection step (Column 4, Lines 11-15).

With respect to claim 4, Flonc describes the mandrel as having means for heating while the preform is subject to light pressure. Flonc further describes a preferred method using a vacuum bag in which the resin is subsequently heated to melt the adhesive material or resin to bond the dry fiber preforms. In this instance, the vacuum would necessarily contribute to the flow of the adhesive material into the dry

fiber preforms. It is noted that the vacuum and heating can be performed within the same enclosure (e.g. vacuum bag), as is recognized in the composite industry.

Regarding claim 5, Flonc suggests that the dry fiber preforms are heated to a temperature of about 180 degrees Fahrenheit (Column 3, Lines 50-52).

With respect to claim 6, Flonc describes the cooling of the thus heated assembly to allow the adhesive or resin to solidify and firmly hold the preform layers together. The language of Flonc ("upon cooling") suggests that the assembly is exposed to room temperature conditions, which are contained within the broad range of the claimed invention.

Claim Rejections - 35 USC § 103

7. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Flonc as applied to claim 2 above and further in view of Setiabudi (US 5,840,238). As previously stated, Flonc discloses a method of improving the stability of dry fiber preforms in the manufacture of fiber reinforced composites by disposing and subsequently heating an adhesive material or resin between adjacent preforms prior to injecting resin into the assembly. In describing the process, Flonc suggests that once the heated assembly is disposed within the mold, resin is injected into the mold and the mold is heated to the curing temperature of the resin (Column 4, Lines 10-15). Although Flonc fails to expressly describe the values associated with the curing temperature, the broad range of the claimed invention is consistent with commonly used resin materials in the manufacture of fiber reinforced composites using a resin transfer method. For example, Setiabudi is directed to a method of forming a fiber reinforced composite in which the

curing temperature of the injected resin is between 40 and 300 degrees Celsius, preferably between 60 and 200 degrees Celsius (Column 2, Lines 5-15). These values are equivalent to between 72 and 512 degrees Fahrenheit, preferably between 140 and 392 degrees Fahrenheit, and encompass the entire range of the claimed invention (200-400 °F). As such, one of ordinary skill in the art at the time of the invention would have found it obvious to cure the assembly of Flonc to a temperature in accordance to the limitations of the claimed invention. Lastly, the specific cure temperature is dependent on the type of adhesive/resin used, the desired curing time, and the thickness of the assembly.

8. Claims 7-11 and 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Flonc as applied in claim 1 above and further in view of Crane and McClure (US 6,555,045). Flonc discloses a method of forming a fiber reinforced composite comprising the steps of disposing a solid adhesive material/resin between adjacent dry fiber preforms, placing the adhesive/preform assembly in a vacuum bag and heating said assembly to melt the adhesive/resin and bond the layers, placing the thus heated assembly in a mold and injecting resin into the mold to wet the fiber preforms, wherein said mold is heated in order to cure the fiber reinforced composite. While Flonc fails to expressly describing the adhesive material as a "layer of thin film adhesive", the reference does communicate the desire for the adhesive/resin to be applied in solid form and as such, one of ordinary skill in the art at the time of the invention would have found it obvious to apply the adhesive/resin of Flonc as a "thin film adhesive". Furthermore, it is well known that adhesive films represent a suitable and

extensively used arrangement for the application of solid adhesive materials in the manufacture of fiber reinforced composites. Crane provides one example of a similar fiber reinforced composite in which an adhesive or resin sheet is applied to the surface of a dry fiber preform (Figure 1 and Column 3, Lines 15-20). Thus, it is recognized in the composite industry that adhesive or resin materials can be applied in film or sheet form and as such, it would have been obvious to one of ordinary skill in the art at the time of the invention to arrange the adhesive material of Flonc as a "thin film adhesive material". With respect to the resin transfer molding of Flonc, Flonc fails to include a vacuum to draw the resin through the assembly. In any event, vacuum assisted resin transfer molding is extremely well known in the composite industry, as shown for example by McClure, and as such, one of ordinary skill in the art at the time of the invention would have found it obvious to include a vacuum means in Flonc. In particular, McClure recognizes the benefits of increased and more even wetting due to the use of a vacuum source, which causes the resin to be pulled across the assembly (Column 1, Lines 12-42). Thus, the use of a vacuum to assist the transfer of the resin through the assembly would have been well within the purview of one of ordinary skill in the art at the time of the invention.

Regarding claims 8 and 16, Flonc suggests heating the adhesive/resin material to about 180 degrees Fahrenheit.

With respect to claims 9 and 17, one of ordinary skill in the art at the time of the invention would have recognized that the specific heating temperature is dependent on, among other things, the specific adhesive/resin used and the thickness of the assembly.

A heating temperature of 250 degrees Fahrenheit would have been within the purview of one of ordinary skill in the art at the time of the invention since these temperatures are consistent with softening temperatures of commonly used adhesive/resin materials, there being no conclusive showing of unexpected results to establish a criticality for the claimed heating temperature. It is noted that the suggestion by Flonc to heat the assembly to 180 degrees Fahrenheit is only exemplary and one of ordinary skill in the art at the time of the invention would have readily appreciated the use of additional adhesives/resins having a variety of softening temperatures.

Regarding claims 10 and 11, Flonc describes the solidification of the adhesive/resin "upon cooling" (Column 3, Lines 55-56). The language of Flonc ("upon cooling") suggests that the assembly is exposed to room temperature conditions, which are contained within the broad range of the claimed invention.

With respect to claim 15, Flonc clearly recognizes the steps of applying vacuum, heating the adhesive material to melt said material, and injecting resin into a molding assembly and curing said assembly. In addition, one of ordinary skill in the art at the time of the invention would have readily appreciated the use of vacuum with the resin transfer molding since vacuum assisted resin transfer molding represents a well known and extensively used technique to more efficiently wet the assembly. Thus, all of the steps defined by the claimed invention are suggested by the combination of references noted above. Lastly, although Flonc fails to describe the same vacuum enclosure as being present during the adhesive heating and the resin injection, the combination of references do teach all the manufacturing steps and one of ordinary skill in the art at the

time of the invention would have recognized that a single vacuum enclosure could have been utilized in the method of Flonc.

9. Claims 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Flonc, Crane, and McClure as applied to claim 7 above and further in view of Setiabudi. As previously stated, Flonc discloses a method of improving the stability of dry fiber preforms in the manufacture of fiber reinforced composites by disposing and subsequently heating an adhesive material or resin between adjacent preforms prior to injecting resin into the mould. In describing the process, Flonc suggests that once the heated assembly is disposed within the mold, resin is injected into the mold and the mold is heated to the curing temperature of the resin (Column 4, Lines 10-15). Although Flonc fails to expressly describe the values associated with the curing temperature, the broad range of the claimed invention is consistent with commonly used resin materials in the manufacture of fiber reinforced composites using a resin transfer method. For example, Setiabudi is directed to a method of forming a fiber reinforced composite in which the curing temperature of the injected resin is between 40 and 300 degrees Celsius, preferably between 60 and 200 degrees Celsius (Column 2, Lines 5-15). These values are equivalent to between 72 and 512 degrees Fahrenheit, preferably between 140 and 392 degrees Fahrenheit, and encompass the entire range of the claimed invention (200-400 °F). As such, one of ordinary skill in the art at the time of the invention would have found it obvious to cure the assembly of Flonc to a temperature in accordance to the limitations of the claimed invention. Lastly, the

specific cure temperature is dependent on the type of adhesive/resin used, the desired curing time, and the thickness of the assembly.

Regarding claim 14, the broad range for the duration of the curing/heating would have been readily appreciated by one of ordinary skill in the art at the time of the invention. In particular, the curing or heating time would likewise be dependent on the type of adhesive/resin used and the thickness of the assembly, it being recognized that a duration between 4 and 8 hours is consistent with common curing/heating times in the manufacture of fiber reinforced composites, there being no conclusive showing of unexpected results to establish a criticality for the claimed duration.

10. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Flonc, Crane, and McClure as applied to claim 15 above and further in view of Setiabudi. As previously stated, Flonc discloses a method of improving the stability of dry fiber preforms in the manufacture of fiber reinforced composites by disposing and subsequently heating an adhesive material or resin between adjacent preforms prior to injecting resin into the mould. In describing the process, Flonc suggests that once the heated assembly is disposed within the mold, resin is injected into the mold and the mold is heated to the curing temperature of the resin (Column 4, Lines 10-15). Although Flonc fails to expressly describe the values associated with the curing temperature, the broad range of the claimed invention is consistent with commonly used resin materials in the manufacture of fiber reinforced composites using a resin transfer method. For example, Setiabudi is directed to a method of forming a fiber reinforced composite in which the curing temperature of the injected resin is between 40 and 300 degrees

Celsius, preferably between 60 and 200 degrees Celsius (Column 2, Lines 5-15). These values are equivalent to between 72 and 512 degrees Fahrenheit, preferably between 140 and 392 degrees Fahrenheit, and encompass the entire range of the claimed invention (200-400 °F). As such, one of ordinary skill in the art at the time of the invention would have found it obvious to cure the assembly of Flonc to a temperature in accordance to the limitations of the claimed invention. Lastly, the specific cure temperature is dependent on the type of adhesive/resin used, the desired curing time, and the thickness of the assembly.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Seal (US 5,403,537) teaches a method of forming a fiber reinforced composite structure including the steps of applying resin to an assembly formed of a plurality of dry fiber preforms and subsequently heating the assembly to cure the resin, wherein a vacuum is applied to remove air prior to the introduction of said resin and also to assist the flow of resin through the assembly of dry fiber preforms. Reacely (GB 2,225,277) discloses a method of forming a fiber reinforced composite article including placing a polymeric binder or adhesive between adjacent dry fiber preforms (individual dry fabric plies), heating said adhesive to fuse said adhesive and bind the preforms together, injecting a resin into a molding assembly under pressure to impregnate the preforms, and heating the assembly to cure the resin and form the fiber reinforced composite article. It is noted that Reacely suggests that a vacuum source

can be used during heating of the adhesive to promote penetration through the plurality of fabric plies.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Justin R Fischer** whose telephone number is **(703) 605-4397**. The examiner can normally be reached on M-F (7:30-4:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Ball can be reached on (703) 308-2058. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Justin Fischer

August 26, 2003

Michael W. Ball
Supervisory Patent Examiner
Technology Center 1700